

INFLUENCE OF DISLOCATION
STRUCTURE ON DEFORMATION PROCESSES
IN AlGa_N/Ga_N/(0001)Al₂O₃ HETEROSTRUCTURES

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S u m m a r y

The results of high resolution X-ray diffractometry (HRXD) studies of the structural properties of AlGa_N/Ga_N/(0001)Al₂O₃ heterosystems are reported. The microscopic nature of spatial heterogeneities (microdeformations and the dislocation density) in those structures is discussed on the basis of the results obtained. The gradient distribution of dislocations and deformations over the structure depth both in the mosaic (block) structure of nitride layers and across the interface with the sapphire substrate has been confirmed by numerical simulation. The correlation between the deformation and the dislocation density in both the layers and the substrate with the variation of the substrate thickness has been established. In particular, the growth of sapphire substrate thickness has been demonstrated to result in an increase of dislocation density and a decrease of elastic deformations in the layers. The scenario of a connection between elementary cells of the layer and the substrate at the interface, which minimizes the lattice misfit, has been confirmed experimentally.